

low lands and the *Chattahoochee* at Gainesville, Ga., on the 16th, overflowed, causing much damage to crops, fences and bridges. Since printing the table of heights of rivers on chart No. III the reports received from Portland, Oregon, give the height of water in the Columbia river: highest, 3rd, 5 ft. 6 in.; lowest, 22nd and 23rd, 1 ft. 4 in.

*Ice in Rivers and Harbors.*—The following notes on the breaking up of ice, &c., and opening of navigation are reported by observers: *Yellowstone River.*—Fort Keogh, Mont., 23rd, ice broke up. Fort Buford, 24th, ditto. *Missouri River.*—At Fort Buford, Dak. T., the river below the mouth of the Yellowstone broke up on the 26th and above on the 28th. Fort Stevenson, ice broke up on the 29th, Bismarck, 30th, Fort Yates, 30th, 1:30 p. m. Omaha, ice disappeared on the 20th. Plattsmouth, river open on the 2nd, closed on the 14th, and open again on the 20th. *Dakota River.*—Morrison, ice disappeared on the 25th. *Mississippi River.*—St. Paul, ice broke up on the 26th, but remained gorged until the 29th. La Crosse, 6th, river open; 14th to 18th, river frozen above city; 12th, first steamboat arrived from below. Davenport, 1st to 18th, floating ice. Keokuk, from 1st to 17th, floating ice. Burlington, 17th, river clear of ice. *Rock River.*—Rockford, Ill., 14th and 15th, frozen over. *Des Moines Rapids Canal.*—8th, open. *Lake Superior.*—Duluth, harbor closed entire month; 31st, the ice was two feet thick and extended out about thirty miles. Marquette, 24th, the ice in the bay over two feet thick. *Lake Huron.*—Alpena, 8th, steamer left port, but had to return, and was ice-bound until the 23rd; river frozen until the 30th. Port Huron, 18th, first boat from Toledo. *Lake Michigan.*—At Escanaba navigation closed: bay frozen throughout month. At Northport the bay continues low; navigation opened on the 31st. Milwaukee, 13th and 14th, ice around pier. *Detroit River.*—Detroit, first steamer left on the 9th: 13th to 19th, river full of floating ice. *Lake Erie.*—Toledo, coasting scows running on the 2nd; first steamers and schooners left on the 13th. Buffalo, 19th, first vessels arrived. Sandusky, 8th, first vessel left port. Cleveland, 9th, first steamer arrived. *Lake Ontario.*—Rochester, 23rd, first vessel arrived; Oswego, 21st, ditto. Catawissa, Pa., 17th, North Branch of Pennsylvania canal opened for navigation. *Otsego Lake.*—Cooperstown, N. Y., lake open on the 5th, but closed again on the 9th. *Hudson River,* Albany, 1st, river open to New York; 10th, first steamer left for New York. *Lake Champlain.*—Burlington, 6th, lake open; 23rd, temporarily frozen over; 29th, Shelburne Bay, south of city, still closed with heavy ice; 29th, first steamer left for Plattsmouth. *Lake Massachusetts.*—Auburn, N. H., 31st, about half free of ice.

*High Tides.*—Atlantic City, 29th; Portsmouth, N. C., 10th, 29th; Indianola, Tex., 21st, 22nd.

*Low Tides.*—Baltimore, 25th.

## TEMPERATURE OF WATER.

The *temperatures of water* as observed in rivers and harbors, with average depth at which observations were taken, is given in the table on the left side of chart No. II. At the following stations observations were not made on the dates indicated on the account of ice:—Duluth, Escanaba and Marquette throughout the month; Alpena, 1st to 29th; Milwaukee, 13th and 14th; Detroit, 13th to 19th; Burlington, 1st to 7th and 9th to 28th. On account of breakage of thermometer no observations were made at Alpena on 30th and 31st: at Eastport from 10th to 31st; at Milwaukee from 28th to 31st; at New York City, from 1st to 7th and 19th to 25th, and at San Francisco from 1st to 13th.

## ATMOSPHERIC ELECTRICITY.

*Thunder-storms*—were reported in the various districts as follows: New England, 5th; Middle Atlantic States, 4th, 5th, 22nd, 23rd, 26th to 28th; South Atlantic States, 5th, 6th, 13th to 16th, 18th, 27th, 28th; Gulf States, 8th to 16th, 18th, 19th, 27th, 28th, 31st; Tennessee and the Ohio valley, 3rd to 6th, 11th, 12th, 16th, 23rd, 25th to 29th, 31st; Lake region, 3rd to 5th, 27th; Upper Mississippi and Lower Missouri valleys, 2nd to 6th, 25th to 27th, 31st; California, 3rd at Sacramento and Visalia, 14th at San Diego.

*Auroras.*—Isolated cases of aurora are reported as follows: 1st, Pembina, Dak.; 3rd, Oregon, Mo.; 8th, Nora Springs, Iowa; Manitowoc, Wis., 9th, 10th, dark segment with "merry dancers;" 9th and 21st, Frankfort, Mo.; 16th, Starkey, N. Y.; 10th, Orono, Me.; 15th, Ft. Stevenson, Dak., ranging from 60° N. to 60° W.; the beams had a quick lateral motion and were most brilliant about 3 a. m. of the 16th; the beams displayed the greatest brilliancy and altitude when due north, sometimes reaching the zenith; 16th, aurora similar to the 15th though not so brilliant; Ft. Sisseton, Dak., 21st, 8 to 11 p. m.; Williamstown, Mass., 30th. On the 12th at Burlington, Vt., 11:15 p. m., and Eastport, Me., 11:45 p. m.; color, pale yellow, few streamers, no dark segment. Starkey, N. Y., 8 p. m. On the 13th an aurora was observed from Eastport, Me., to Ft. Sisseton, Dak., except where cloudy weather prevented observations. The following descriptions are reported: At Eastport, Me., faint, and of pale yellow color; it began at 11:45 p. m. of the 13th, and ended at 3:00 a. m. of the 14th. At Burlington, Vt., seen for a few minutes through a rift in clouds, and was observed to be faint. Pembina, Dak., "very brilliant aurora at 7 p. m. of the 13th, and continued into the night. The whole northern sky was more or less illumined and the light emitted was almost equal to the moon at the full. A broad arch of light, very bright but rather ill-defined, extended 170° to 270° azimuth, and sometimes reached the zenith. There was a good deal of movement, but it was rather slow and the eye had some difficulty in detecting it. There was also some striated lines of light crossing the arch but nothing like "merry dancers." A peculiarity of this aurora was a number of large whorls of nebulous light, like the large nebula in Canes Venatici, which appeared at several points along